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AUTHOR Staley, Frederick A.
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ABSTRACT

A model for research and evaluation in outdoor education is presented in this paper which includes a bibliography of representative research in outdoor, experiential education. The model stresses close interaction between program designers and evaluators and rests on the premise that the strength of outdoor education--interaction between people, activities, and the outdoors--is best measured using sociological, holistic, alternative evaluation methodologies. A bibliography of approximately 100 entries is organized under the heading of representative research, evaluation studies, noteworthy studies combining research and evaluation, literature reviews, development and use of specific measurement instruments, and recommendations for needed research and program evaluation designs. A list of 77 available measurement instruments follows with reference to the bibliography articles reporting their use. Instruments are organized by the variable measured; headings include participant behavior, creativity, hemisphericity, attitudes and values, and comprehension and cognition. Conclusions and recommendations focus on the need to develop alternative research paradigms appropriate for outdoor education and suggest possibilities for studying right hemisphere activity in relation to outdoor education experiences. (JH)

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The Research, Evaluation and Measurement Dragons in Outdoor Education

by

Frederick A. Staley, Ph.D.
Department of Elementary Education
Arizona State University
Tempe, Arizona 85281

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Introduction

I. Story of a Great Cloud Dragon

A children's story tells of a boy named Han who was the poor gatesweeper of an ancient Chinese city. One day a messenger brought word that the wild horsemen of the north were coming to destroy the city. The Mandarin called together his councilors: the leader of the merchants, the captain of the army, the wisest of the wise men, and the chief of the workmen. The council decided that the only hope of saving the city was to pray to the Great Cloud Dragon for help. The next morning a small fat man arrived at the gate where the boy Han was sweeping. The old man had a long white beard, a shiny bald head, and he leaned on a long staff. He told Han that he was the Great Cloud Dragon come to save the city.

Han was quite surprised. "You don't look like a dragon," he said.

"How do you know?" asked the little old man. "Have you ever seen one?"

"No, I guess not. I will take you to the Mandarin, Honorable Dragon."

The Mandarin was busy meeting with his councilors. He was not happy about being disturbed. When Han humbly introduced the little old man as the Great Cloud Dragon, the Mandarin became very angry. "Don't be ridiculous. He's a fat man who is tracking dirt on my fine carpets. Away with him."

"I have come to help you," said the little fat man. "But if you want a dragon to help you, you must treat him with courtesy. I have come a long way. Give me something to eat and something to drink and speak to me politely, and I will save the city."

The Mandarin was unimpressed. "Everybody knows what dragons look like. They are proud lords of the sky. They wear gold and purple silk. They look like Mandarins."

"This is no dragon," said the captain of the army. "Everyone knows that dragons are fierce and brave, like warriors. The sight of them is like the sound of trumpets. They look like captains of the army."

"Nonsense!" interrupted the leader of the merchants. "Dragons are rich and splendid. They are as comfortable as a pocketful of money. They look like merchants. Everyone knows that."

"You are all wrong," said the chief of the workmen. "Everyone knows that dragons are strong and tough. Nothing is too hard for them to do. They look like workmen."

It remained only for the wisest of the wise men to speak. "The one thing that is known-and indeed I can show it to you in 47 books- is that dragons are the wisest of all creatures. Therefore they must look like wise men."

At that moment screams and yells were heard outside. On the horizon the dark mass of wild horsemen could be seen. The councilors pushed the little old man aside and ran away to hide.

"Well," said Han. "I don't think we have much time. The enemy will be here soon. I don't know whether you are a dragon or not, but if you are hungry and thirsty please do me the honor of coming into my humble house."

The old man ate and drank, then he said to Han, "for your sake I will save the city." The wild horsemen were nearly at the gate. The little man blew a great breath. A huge storm arose which caught the horsemen and drove them away. As the storm subsided the little fat man said to Han, "now I will show you what a dragon looks like." As he sprang up into the air his changed form filled the sky. According to the story, "he grew taller than the tallest tree, greater than the greatest tower. He was the color of sunset shining through rain. Scales covered him, scattering light. His claws and teeth glittered like diamonds. His eyes were noble like those of a proud horse. He was more beautiful and more frightening than anything Han had ever seen. He flew high, roaring, and vanished into the deep sky."

Han went through the city telling the hiding people that the dragon had saved them. The Mandarin rewarded Han and named him the Honorable Defender of the city. "We are saved," said the Mandarin. "But best of all we know what a dragon looks like. He looks like a small, fat, bald old man." (adapted Patton, #122 in Part VII of Bibliography)

II. An Overview of Research, Evaluation and Measurement in Outdoor Education

"Science begins with definitions and classification systems. The awsome complexity of reality is simplified and ordered by defining and classifying selected elements within that reality. What we sometimes loose sight of is that all scientific systems of definition and classification are perceptual, artificial, and arbitrary. Whose definitions prevail at any given time and place is a matter of politics, persuasion, and preference. It is the nature of things that there can never be an absolute definition of what a dragon looks like." (Patton, #122 in Part VII of the Bibliography, page 201.

And so it is with evaluation, research and measurement in Outdoor Education. Decision makers and evaluators have to be defined. Program goals and research questions are then defined. These can be classified according to whether they are vague or clear, general or specific, measurable or immune to measurement. Next, program implementation is defined and classified by type, size, mission, evaluability and effectiveness. Is it to be a resident program, series of trips, set of curricular materials, just for K-3 children? Is it classified as outdoor education, environmental education, adventure education or possibly experential education? What ever it's definition or classification, it should be emphasized these are perceptual, artifical labels based on politics, pursuasion and preference.

Variables are then defined to describe treatment environments and program interventions. We even classify types of evaluations: formative and summative; goal free and goal-based; outcomes and implementation. Finally decisions are made about research evaluation methodologies. In the past, methodology has been the not-so friendly dragon of measurement and design for outdoor educators breathing fire and numbers, questionnaires and equations.

I's like to suggest a model for helping to understand the Research/ Evaluation/Measurement Dragon, to help make him a friendly dragon. This will be done by offering a set of definitions appropriate for outdoor educators and then by describing how the model of research/evaluation measurement can be and has been used in outdoor education.

Specific recommendations will also be made regarding future and appropriate types of research evaluation methodologies. Finally, suggestions are made for researching an important variable in outdoor education that has yet to be studied.

The Bibliography contained within does not list all the evaluation research done in the field of outdoor education. Representative studies, reviews of research and support documents are provided to add clarity to the Research/ Evaluation/Measurement Model of the paper. Little suggestion is made that these are the "best" or "worst" studies or documents in the field. Appologies are given for the hundreds of pieces of literature in the field that were ommitted.

Model for Understanding Research, Evaluation and Measurement

I. Definitions

A. Research - the process of generating scientific (empirical) knowledge for the sake of knowledge. Seeking to understand cause and effect relationships.

B. Evaluation - the process of collecting data to help enlightened decision makers improve educational enterprises.

Note: Although these are inextricably linked in the minds of many educators, they are generally not mutually enhancing endeavors, and ought to be undertaken separately.

(The above are derived from David Rosen, "New Evaluation for New Schools," in Changing Schools, Educational Alternatives Project, Indiana University, School of Education, Room 328, Bloomington, Indian, 47401, taken from Godfrey, #82 in Part IV of Bibliography.

C. Measurement - the collection of data using valid and reliable procedures and instruments.

II. Two Types of Research and Evaluation

A. Experimental - empirical, causal relationships, scientific method, natural-physical science model, deductive.

1. Characteristics - quantative measurement, experimental design (pre-test, treatment, post-test).

2. Goal - predicting phenomenon and producing generalizations, product oriented.

3. Assumptions - a single identifiable, isolated and measurable treatment remains relatively constant and unchanging.

4. Use - works well in static or fixed systems or enterprises and when components of the system (social or physical) can be clearly identified and analyzed. If so it can provide limited and simple answers to cause/effect relationships.

Some aspects of outdoor education may lend themselves to Experimental Research - those that attempt to measure specific changes in outdoor education participants as a result of specific treatments.

5. Limitations - results are often too narrow and thus add little information to understanding the true dynamics of outdoor experiences.

While research measurement devices (such as standardized tests) are often highly reliable, their validity is often questionable for use in specific outdoor education programs.

It is extremely difficult in outdoor education programs to control, let alone even identify all the variables they may have on impact on participants.

Because of the above it is extremely difficult to find acceptable research measuring devices and to create an adequate research design.

As a result outdoor researches resort to "quasi-experimental" designs which are frought with criticism because of design inadequacies and threats to internal and external validity. Such designs often yield results which add little to the field of outdoor education because of "no significant differences found." Actually, there probably have been significant differences in many researched outdoor programs but because of inadequacies in design, selection of instruments, sampling procedures and other violations of validity, these positive effects have not been detected.

Where there have often been positive changes, researchers often are unable to say why and how these occurred - thus they fail in their ability to determine causal relationships and such results have not been useful in making generalizations to other programs.

B. Non-Experimental - alternative, anthropological field methods, holistic, inductive.

1. Characteristics - qualitative measurement, holistic analysis, closeness to data, validity emphasized, inductive - dealing with individual cases, focus on personal and situational rather than absolutes, process oriented.

2. Goal - to explain what there is, descriptive.

3. Assumptions - dynamic systems (such as outdoor education programs) require analysis of the changes occurring over time and the impact of these changes. This requires understanding and documentation of the day-to-day reality of the setting and should not be tied to a single treatment and predetermined goals and objectives. Furthermore, attempts should not be made to manipulate, control or eliminate developments but to take as given the complexity of a changing reality. Evaluation thus tries to unravel what actually happens. Data are not just outcomes, but changes in treatments, patterns of action, reaction and interaction.

4. Use - ideal for the evaluation of most outdoor education programs because it provided information that is useful for making decisions about program effectiveness. It thus contributes to program-development, not its labeling of successes and failures. It is at the local level of immediate program evaluation that non-experimental paradigms are most useful. Furthermore, such evaluation can lead to more accurate identification of treatments, which then can be researched using experimental designs.

5. Limitations - requires sensitivity to both qualitative and quantative changes in programs throughout their development, not just at some end point in time. It is built on subjective inferences in the sense that the investigator attempts to develop empathy with program participants and understand the changing meaning of the program in the participants own terms, it requires getting close to the data, becoming intimately acquainted with the details of the program.

   Because of the domination and superiority of experimental methods in the minds of many decision makers and funding sources, it is difficult to convenience them of the usefulness of non-experimental evaluation paradigms.

6. Types of Non-Experimental Evaluation Procedures

   1. Participant Observation
   2. In-Depth Interviews
   3. Questionnaires
   4. Surveys
   5. Life Histories
   6. Case Histories
   7. Detailed Description
   8. Qualitative Field Notes
   9. Responsive Evaluation
      (See Stake #124 in Part VII of Bibliography)
   10. Illuminative Evaluation
      (See Parlett & Hamilton #120 in Part VII of Bibliography)

   For further discussion, see other sources cited in Part VII of Bibliography.

III. Use of the Research Evaluation Model

The above presents two paradigms of research evaluation as a set of dichotomies: qualative versus quantative methodology, subjective versus objective, closeness to versus distance from data, holictic versuses component analysis, etc. In reality these are not dichotomies but coninua about which evaluators and scientists vary. These continua constitute dimensions of choice for evaluators and decision-makers in matching methods to programs.

Outdoor educators involved in assessing the effectiveness of their programs ought to realize that different kinds of programs and goals require different types of research evaluation methodology. If we only want to know the number of trees a student can identify or the frequency of interaction between children of different races in resident outdoor settings, then statistical procedures are appropriate. However, if we want to understand the relevence of trees to children's lives or the meaning of interracial interactions, then some form of qualitative

methodology (such as participant observing, in depth interviewing and scientific field noting) that allows the researcher to obtain firsthand knowledge about the physical, living and social world of the resident camp may be more appropriate.

A serious threat to the use of appropriate research evaluation methodologies in outdoor education, and in education in general, is that many involved in decision making, funding and researching such progrrams have been trained, indoctrimated or led to believe in the superiority of emperical research. For them research is usually not defined in terms of the relevency of the information, understandability or usefulness from the point of view of program participants and program designers. Consequently the dominance of quantitative experimental methodologies appears to have cut off the great majority of outdoor education practioners from seriously considering the use of any alternative evaluation research paradigm or method. Furthermore, when viewing the world (or dragons) only with emperical research eyeglasses the perceptions, definitions, assumptions and biases associated with these methodologies often make it difficult for people to agree on what it is they are seeing. Such emperical based perceptions and definitions may even lead people to conclude there are no such things as dragons. But, in outdoor education we know there are friendly dragons.

Thus, an urgent responsibility of outdoor educators should be to help educate decision makers and funding sources such as school administrators, school boards, state departments of education, college and university research bureaus and state and federal legislators about the appropriateness and values of alternative research evaluation methodologies. Besides trying to remove preconceived notions or the domination of one and only one research model, the next responsibility of outdoor educators is to help significate decision makers and funding sources realize that the experimental and non experimental paradigms described above are actually continua along which decisions of choice can be made.

Once an openness to all research evaluation possibilities has been established the next steps in designing an appropriate research evaluation methodology are as follows:

1. There should be close interaction between program designers and evaluators. The program designers should clearly describe the goals, objectives and planned treatments of the program.

2. The program designers and evaluators then attempt to match paradematic perspectives - to find the right procedures for the task - to agree on a definition of what a dragon looks like.

3. Next, appropriate evaluation methods can be selected that will do justice to the questions under study by determining the most valid and reliable vehicles for finding answers with the resources available.

4. While multiple methods are preferable, there are always more methods possible than resources available. Thus, methods selected should be the ones most appropriate to answering the questions within the meaning framework (bias) of the decision-makers, program designers and evaluators.

When there is an openness to all possibilities and a great deal of interaction between program designers and evaluators there is a greater choice of effective program evaluation because the practioner understands, believes in and has a stake in evaluation data.

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Representative "Standardized" Measurement Instruments Used in Outdoor Education Research and Evaluation

Notes:

1. The number at the end of each measurement instrument refers to the studies listed in the Bibliography.

2. Measurement instruments are placed into categories which correspond closely with some of the major variables that have been studied in various outdoor/environmental/adventure programs.

3. No suggestion is made that these are the "best" (most valid and reliable) instruments available to measure the variables identified. They are only the ones used in the studies reviewed.

4. Generally, instruments designed just for the use in one study have been excluded from this listing.

5. As indicated previously, anyone beginning a program in outdoor education with a research/evaluation component should first make a careful analysis of what the program is designed to achieve (the goals and objectives). Then a search to find or develop valid and reliable instruments appropriate for measuring the anticipated (and perhaps unanticipated) outcomes can occur. Reversing the process by finding a measurement instrument first and then trying to fit it to the program often proves fatal.

   The following list should thus be thought of as a beginning point in the search for available instruments once program goals and outcomes have been determined.

A. Participant Behavior-Involvement

1. Use of photographs - 19, 94
2. Interaction Analysis (Flanders) - 4
3. Devereux Elementary School Behavior Rating Scale - 7
4. Devereux Adolescent Behavioral Rating Scale - 36
5. Bovard Scale of Interpersonal Affect - 36
6. Peterson-Quay Behavioral Problems Checklist - 20
7. Kelly and Baer Behavioral Rating Scale - 82
8. Bender-Gestalt Visual Motor Development - 23
9. Hayden Test of Physical Fitness for Mentally Retarded - 23
10. Assessment of Developmental Stature and Progress Stature - 43
11. AAHPER Youth Fitness Test - 16
12. Wood's Behavior Preference Record - 32
13. Haggerty-Olson-Wickman Behavioral Rating Schedule - 32

B. Hemisphericity (Left/Right Brain)

1. Your style of Learning and Thinking - 42, 109, 37

2. EEG Test - 114
3. Torque Test - not used

C. Creativity

1. What kind of person are you - 42
2. Something about Myself - 42
3. Steins Physiogamic Cue Test - 42
4. Remote Associates Test - 42
5. Sounds and Images - 42
6. Onomatopia and Images - 42
7. Welsh Figure Preference Test - 42
8. Torrance Test of Creative Thinking - 22, 29, 42

D. Locus of Control

1. Nowicki-Strickland Locus of Control - 20
2. Rotter Scale of Internal and External Control - 82

E. Self Concept

1. All About Myself Scale - 20
2. Gough Adjective Checklist - 31
3. Semantic Differential - 82
4. Tennessee Self Concept Scale - 1, 73

F. Anxiety

1. State Trait Anxiety - 31, 82

G. Self Actualization

1. Personal Orientation Inventory - 73

H. Comprehension-Cognition

1. Peabody Individual Achievement Test - 35
2. Wide Range Achievement Test - 23
3. Environmental Resource Concepts and Applications Survey - 25
4. Boehm Test of Basic Concepts - 35
5. Comprehensive Test of Basic Skills - none but a good one
6. The Cooperative American History Test - 39
7. Florida Taxonomy of Cognitive Behavior - 40
8. Iowa Basic Skills Test - 4
9. Watson-Glaser Critical Thinking Appraisal - 13

I. Attitudes-Values

1. Outdoor Education Inventory - 11
2. Environmental Semantic Differential - 28, 34
3. Environmental Concern Inventory - 34
4. Questionnaire on Environmental Problems - 34
5. Inventory of Science Attitudes, Interests and Appreciations - 74
6. Chase Outdoor Education Inventory - 91
7. Attitude Claster Survey on Environmental Problems - 77
8. Attitude Toward Physical Activity - 105
9. Comparison of Attitudes toward Physical Activity - 105

10. Alport-Vernon Lindsey Study of Values - 39
11. SRA Junior Inventory (Needs and Problems) of 10-14 year olds - 9
12. Environmental Questions - 28
13. Environmental Preference Sheet - 28

J. Personality

1. California Test of Personality - 16, 39, 41
2. Bovard Scale of Interpersonal Affect - 31
3. Barron's Ego Strength Scale - 27
4. Edward's Personal Preference Scale - 27
5. Personal Orientation Inventory - 73

K. Group Dynamics - Social Climate

1. Wagman Group as a Whole Scale - 36
2. School Climate Scale - 82
3. Remmer's Attitude Scale for Measuring Attitudes Toward Races and Nationalities - 39
4. Classroom Social Distance Scale - 17
5. Guess Who Sociometric Technique - 15, 50

L. Leadership

1. Leadership Opinion Questionnaire - 5

M. Teacher Behavior

1. Flander's Interaction Analysis - 12
2. OSCAR - 12

N. Definition of Outdoor Education

1. Chase Outdoor Education Inventory - 11, 91
2. Criteria for the Assessment of the Comprehensiveness of a School District's Program - 108
3. Attitudes toward the Term Outdoor Education - 24

O. Program-Curriculum

1. A Systems Analysis Approach for Self Evaluation - 60
2. Guide for Self Appraisal and Certification of Resident Outdoor Environmental Education Programs - 90
3. Instrument for Evaluating Residential Outdoor Education Centers in Canada - 98
4. Outdoor Education Program Guide - 104
5. Planning Assistance through Technical Evaluation of Relevence Numbers - 49
6. Administrators Environmental Education Evaluation Manual - 89
7. Instrument to Evaluate Resident Outdoor Education Laboratory School Programs - 95

Conclusions and Recommendations

Based on the model described here and the review of literature there are several conclusions and recommendations that can be made regarding past and future research, evaluation, measurement efforts in outdoor education.

I. Conclusions

1. While there has been talk in the last twenty years that the field of outdoor education has been lacking a solid research evaluation foundation, my analysis and review of studies, using the model presented here, leads me to conclude these criticisms are no longer valid.

   I believe we have done a good job with program evaluation. The number of programs that continue to exist and emerge and be funded attests to this. We have been quite accountable in this age of accountability.

   Particularly representative of good program evaluation are those studies cited in Part III of the Bibliography. Outward Bound efforts to clearly define and measure growth and changes in the affective domine are noteworthy because of their excellent use of participant observers, in depth interviews, check lists, diaries and questionnaires.

2. We have, however, lacked in our ability to communicate and educate others about the value and significance of using alternative evaluation procedures instead of just the emperical research models of assessment.

   It may well be this lack of educating others that has lead to criticism of outdoor education rather than poorly designed evaluations procedures.

3. We have not been very successful in the area of outdoor educational research, as defined in this model, and perhaps deserve much of the criticism we've received for past research efforts.

   This has not been totally our fault, however, because we haven't been given adequate advise about alternative designs and because we haven't had very valid and reliable measurement instruments to use. Our efforts at using just experimental methods have not resulted in useful data primarily because we haven't been able to control and understand all the variables required to carry out pure experimental research.

   The kinds of quasi-experimental studies we have attempted (see Part I of the Bibliography) have yielded inconclusive results. Quite often they were attempts to apply experimental designs that did not match the programs and goals they were attempting to find out about.

4. The above can also be said of almost all educational research, however. N.L. Gage, one of the leading educational researchers, observed recently, "Most reviewers of research on teaching have concluded their reports by

saying that past work has been eventually fruitless." (N.L. Gage, "The Yield of Research on Teaching, "Phi Delta Kappon, November, 1978, page 229.)

5. The reason for our failures in outdoor education and educational research in general is obvious to me. We've been using inappropriate models of evaluation research. The experimental, scientific, engineering model of research doesn't fit the social dynamics involved in most educational programs. The strength of outdoor education is the interaction that occures between people, activities and the outdoors and this strength is best measured using sociological, wholistic, alternative, evaluation methodologies.

II. Recommendations

1. Instead for continuing to search for that single model of outdoor education that will work everywhere, school principals, school boards, legislators and government administrators must find ways to stimulate innovation and adaptation of programs to fit unique local needs and circumstances. Evaluation of such programs must also be initially based on the unique characteristics and goals of local programs, not automatic evaluation research designs using standarized criteria applied across the board.

2. Outdoor educators should do a better job of communicating with and educating decision makers and funding sources about all research evaluation paradigms.

3. Colleges and Universities preparing outdoor educators should be providing training and experience not only with experimental research designs but with alternative research evaluation paradigms as well.

4. An excellent source of study about alternative research evaluation methodologies is the new wave of emphasis in the social sciences on ethonographic, wholistic research evaluation. See sources listed in Part VII of the Bibliography.

5. Appropriate research in outdoor education is still necessary. One area that lends itself to research, as described here, but has yet to be studied in outdoor education is the relatively new field of psychophysiological or neurophysical research on the brain.

   Although scientists have long known the human brain had two sides or hemispheres, it was thought, until very recently, the two sides mirrored each other in function and that in most people the left hemisphere dominated. Now, massive evidence involving lesion studies, anatomical studies, split-brain research, dichotic listening, tachistoscopic studies, reaction time and sodium amytal, and electroencephalography has indicated the two hemispheres are responsible for different functions and capabilities. The left hemisphere, for most people, is the sight of logical, analytical, linear and propositional thought. It has primary control not only of the right side

of the body but of such functions as talking, reading, writing, mathematical calculation, immediate verbal recall, time sense, order, and most activities involving linguistic and numeric processes.

The right hemisphere controls the left side of the body and perhaps more importantly it is the locus of intuitive, imaginative, metaphoric and holistic thinking. As such it controls dreaming, fantasizing, spacial perception, body awareness and movement, tactile sensations, visual memory, and perhaps many of our emotions. The right hemisphere is virtually non-verbal.

It's clear to me that schools by and large and our Western society in general have emphasized the left hemisphere to the detriment of the right hemisphere. The emphasis on the basics of reading, writing and arithmetic (all left brain functions) attests to this. As a consequence we are not meeting the needs of learners who have a right brain orientation to learning. Furthermore we are educating lopsided individuals who are more concerned with the logic and order of things rather than individuals who equally enjoy the beauty, serenity and natural rhythms of life.

The recent history of outdoor education supports this claim. Many outdoor educators went through a period from 1950-1970 attempting to prove outdoor education was the key to children's left brain cognitive development. Research supporting these claims attempted to prove growth in mathematics, science, reading or language skills. (See studies numbered 13, 14, 18, 76, 42, 102 in the Bibliography). Titles of such programs reveal their left brain emphasis: "Outdoor Science," "Mathematics in the Forest," "Concepts of Environmental Education." By and large these kinds of outdoor education programs were not interdisciplinary and whole child oriented. This is not to say these left brain emphases and left brain research conclusions were not valid. Rather, it is to say these programs restricted their focus to children's left brain abilities and development.

With the knowledge now available about the separate abilities and importance of both hemispheres, it is imperative that future programs and research stop discriminating against the right hemisphere and expand to include the full range of mental abilities.

The task is not that difficult, however. Outdoor educators have always had the outdoors and nature as their classroom and teaching medium. It is hard to be cognitive, numerical and objective when facing a gorgeous waterfall, witnessing the emergence of a beautiful butterfly from its chrysalis, or climbing the rock face of a mountain. Observing of rain, measuring of tree rings, timing the growth of a century plant in blossom, singing around a campfire and sleeping overnight in the forest with friends cannot be done with only one side of the brain. Both hemispheres are busy.

Samples, who is emerging as a leading spokesperson for equal emphasis of

both hemispheres in education, went so far as to say that nature provides the evolutionary link between the environment and man's right hemisphere. Furthermore, he said, "The richest source of metaphor is nature...and...if there is to be survival, the realms of nature, its metaphoric reservoirs, and its mind in humans must be resurrected." (see # in the Bibliography)

While many outdoor educators have probably known intuitively what Samples claims, they have not been able to express it quite the same way. They instead insist that it is the "mystique, magic or electricity" of the outdoors that makes for effective learning and development of the whole child. Conclusions of hemispheric brain research suggest that it is the right hemisphere of the mind that understands the "mystique," interprets the "magic" and is turned on by the "electricity" of the outdoors. The outdoors is, after all, holistic; communicating simultaneously with audible and nonaudible messages to all the senses. As such, it is the right brain capacities for aesthetics, emotions, feelings and for intuitive and metaphoric thinking that permits interpretations of outdoor experiences.

The outdoor mystique achieves its ultimate impact on the individual in what Maslow calls a "peak experience," (Abraham H. Maslow, The Psychology of Being. New York, Van Norstrand Reinhold, 1968). These experiences are probably sensed and interpreted in the right hemisphere but because the right hemisphere is non-verbal it is so difficult or impossible to verbally describe such experiences. This is so because the right hemisphere is able to experience so much more and in ways for which the left hemisphere simply does not have the language to describe.

If outdoor education experiences and programs can make their greatest contribution to right hemispheric activity, as is being suggested above, then, why should we not attempt to better understand how the "outdoor mystique" affects individuals. Perhaps the pressures of tight budgets, accountability and "back to the basics" should compel us even more to find additional means of justifying outdoor education programs.

While some non traditional, alternative evaluation procedures may yield significant information about right hemispheric growth and use as a result of outdoor experiences, this seems to be one aspect of outdoor education, that experimental research is called for. In this respect the following measuring techniques and research questions are offered:

a. Electroencephalography (EEG) is used widely in the study of Hemispheric processing and provides a direct non obtrusive measure of brain activity. Is it possible that portable EEG machines could be used to measure children's mental activities while involved in a variety of outdoor experiences such as climbing a tree, viewing a sunset, cooking on an outdoor stove, singing around a campfire, walking on a nature hike, fishing in a pond, or in connection with some of the following right brain functions?

b. Dreams are a major state of consciousness and, as such, provide an access to right brain information that is not available while awake. Information from dreams can be a source of creativity or a tool for self-understanding. Is it possible that outdoor education experiences can stimulate more and a greater variety of dreams? Does the "outdoor mystique" affect dreams as well?

c. Relaxation and meditation are essential ingredients for right brain functioning. Do outdoor experiences and environments make it easier for participants to enter states of relaxation and meditation?

d. Fantasy is the foundation of serenity and purpose in our lives. If this is so, could outdoor education experiences that encourage fantasy development and imagination reduce individual tendencies toward delinquency, violence, overeating and dangerous drug usage?

e. Extrasensory perception (ESP) is the name given to four types of parapsychological phenomena: telepathy, clairvoyance , precognition and psychokenesis. No one is really sure whether ESP is a sixth sense or an extremely high degree of one or more of the five senses. Could ESP be a nonsensory knowledge that is arrived at more through intuition than the senses? There is some interesting research to indicate that ESP could also be a total combination of feelings throughout the body so that the body as a whole acts as a perceptual organ. One of the outcomes of yoga, tai chi meditation, or other spiritual disciplines is frequently the development of psychic powers. If so, would outdoor encounters that allow students to become relaxed, in tune with nature and in tune with themselves also increase their ESP powers?

f. Metaphoric thinking, as suggested by both Bruner and Samples, is richly stimulated by outdoor experiences and nature. While various modes of expression in art, poetry, music, drama and writing require the functioning of both hemispheres in a creative metaphoric manner, the quality or intensity of the metaphor may depend on the ability of the right brain to sense and comprehend experiences. Will experiences in the outdoors increase participant's abilities to incorporate metaphoric thinking in their creative modes of expression?

For further information about research done with hemispheric functions of the brain see Section VI of the Bibliography.

6. Another strand of research which seems related and which should be pursued is the work being done with experential, adventure and Outward Bound type programs. Such programs emphasize ingredients of a contrast in environment, risk (real or perceived), physical activity, stress, group work, new knowledge and skills and proximity congruency. The latter term is one given by Peters (Peters, Richard, "Strategies to Affect Student Sensory Awareness of the Environment in A Rural Schools Setting: Grade Four Through Grade Six," Unpublished Document, August, 1976, ERIC # ED 134362) and used extensively with Van Matre's concept of Acclimatization. It refers to the state of harmony

existant between two or more animate and/or inanimate objects wherein there is a natural state of interaction. To the extent this includes outdoor participants becoming one with their outdoor environment, this is a wholistic, right brain notion.

The question to be researched is to what extent do the ingredients listed above along with proximity congruency facilitate right hemispheric activity and development?

7. The recommendations for research outlined above should first attempt to determine whether or not certain types of outdoor experiences increase right hemispheric activity. If it can be established the right brain can be activated, it then might be possible to determine whether or not a relationship exists between right and left brain functions and capabilities. That is, will right brain activity actually help the left brain to learn "better" and help the individual to be more healthful and happy.

III. Summary

The story of Han and the Great Cloud Dragon had a moral about definitions and classification systems regarding research, evaluation and measurement that runs through this whole article. Perhaps the real problem is not with definition and classification systems but with language itself. Most research only deals with language. Perhaps we need a new language; one that comes from our non verbal right hemispheres. In other words, maybe we need to open our minds in the future to all research evaluation possibilities.

The exciting part of research evaluation in outdoor education should be our search for answers that really mean something to us. People are most alive when they are in question and uncertain. Such quests help us achieve new levels of consciousness. The problem-and solution- is to make the search deeper not longer.